Numbers in the news

Numbers are everywhere in the news. On a given day, numbers might play a key role in every story on the front page or homepage of the newspaper and every story in a radio or TV broadcast. Budgets, taxes, tuition, troop strengths, death tolls, vote totals, spending bills, interest rates, employment, the stock market, album sales, prices, polls, ages, dates, crowd sizes, health and medical news, every sports story, every food recipe, every weather report — all rely heavily on statistics and calculations.

Nearly every news story depends upon numbers in some way, but not every use of numbers in news stories requires an editor's calculating skills. Times, ages, dates, dimensions and other simple numbers bring depth, authority and clarity to the news. Used carefully, such numbers give stories tangible appeal because they help the audience understand the dimensions and impact of the topic. A feature on day care needs to include statistics about working mothers, while an end-of-season football roundup must offer won-lost, scoring and yardage totals. A mediocre story may point out that a university operates a large shuttle bus system; a good editor will revise the story — or better, help the reporter revise it — to show that the university's bus system, with its 33 full-size buses and five vans, rivals many city bus systems in size.

Like physical details that help the audience picture a scene or event, such numbers bring a sense of concrete reality to the story. At other times, numbers are themselves the news: a first mission to the moon, a third millennium, a 500th coaching victory. Used effectively, numbers tell stories in a unique way. They can even carry an emotional punch. This lead from Danny Freedman of The Associated Press uses a stark, understated series of numbers to capture the horror and scope of the 2002 sniper rampage around Washington, D.C.:

> Dead: 10.
> Tips: more than 138,000.
> Reward: $50,000 at first, then $500,000.
> Lives changed forever: countless.
> Two suspects: John Allen Muhammad, 41, and John Lee Malvo, 17.
> The search: 22 days.
> Bullets fired: at least 14 — taking 10 lives, wounding three.
> The bullet caliber: .223.

Yet many editors are phobic about numbers, especially when they involve calculations. They may try to pass the problem on to someone in the newsroom who "can handle math" or at least knows how to work a calculator. That's ironic, because editors tend to think of themselves as highly logical creatures, and basic math is pure logic. Numbers can be

interpreted in different ways, but they themselves always behave in the *same* way.

A recent Washington Post story said that of the $1.3 million the D.C. Salvation Army collected during its annual Red Kettle fundraising drive last year, $667,000 came from outside local Giant supermarkets – "a little less than half of the group's holiday total." It is actually a little more than half, Post obmudsman Andrew Alexander pointed out in a November 2011 column.

"When a journalist gets numbers wrong or does the math and gets that wrong, it reflects badly on the journalist, his employer, and news purveyors in general," he wrote. He also said that a review of published corrections for the previous three months showed that few days passed without a numbers error.

"I think what's going on is that when journalists see a number, they take it at face value and don't question it," Scott R. Maier, associate professor of journalism at the University of Oregon who specializes in newsroom numeracy, told Alexander. "With numbers, I think journalists tend to abdicate that scrutiny."

"The bad news is, journalists have to learn math. The good news is, it's sixth-grade math," says Arizona State University Professor Steve Doig. Doig, a veteran Miami Herald reporter who is now the Knight Chair in Computer-Assisted Journalism at Arizona State University. He says both professors and students should build a "data state of mind," because accurate and meaningful numbers are vital for quality journalism.

Doig is a proponent of increasing reporters' use of database journalism – using statistics and digital applications to increase the fact-finding power of journalism. While editors usually don't have to handle the nuts and bolts of deciphering databases, they do need to learn to handle a few basic concepts and calculations to be able to deal accurately and comfortably with most numbers in the news. The next sections take some of the basics that editors should know and review the formulas that you probably learned but may have forgotten.

Percentage and percent

Percent is Latin for "in 100." If a story says that state unemployment has decreased from 4.5 percent to 4 percent in the past three months, it is saying that while 4.5 of 100 work-ready people had no job three months ago, four people have no job now. A decrease from 4.5 percent to 4 percent is therefore a decrease of .5, or half a percentage point.

That calculation is simple subtraction because both numbers refer to a scale of zero to 100; we can't have unemployment any lower than zero percent or any higher than 100 percent. We are simply comparing the new

number to the old one on an absolute scale. Such a change is called an increase or decrease in *percentage points.*

However, we can also make the old number the point of reference, rather than using 100 as the point of reference. If we use the state unemployment figure from three months ago — 4.5 percent — as our starting point, we can say that unemployment has declined by about 11.1 percent. We reach that figure by dividing the new figure by the old one — 4.0 divided by 4.5 equals .88888, or just under .89 — and subtracting the result from 1.00. The difference is slightly more than .11111, or about 11.1 percent. Such a change is called an increase or decrease in *percent.*

Enter the politicians. The governor will hold a news conference announcing "a dramatic 11 percent plunge in unemployment following my new Work or Walk Initiative." The governor's critics will accuse him of "spinning the numbers" and scoff that "the actual decline in unemployment is just half a percentage point."

Both are right. Unemployment is down half a percentage point if we consider it on an absolute scale — 100 percent of all work-ready residents. But it is down a more impressive 11.1 percent if we calculate it against the previous figure. The distinction shows how easily numbers in the news can be manipulated, and how important it is for editors to make sure than such numbers are presented in context.

Using real numbers with percentage and percent

Whether we describe the change in unemployment as a percentage change or a change in percent, we are not telling the news audience how many real people are out of work. That's because percentage and percent are proportions, not an actual head count. One simple way of providing the context that gives percentage and percent a real-life dimension is by including the actual numbers that they represent. If your state has 10 million work-ready residents and the unemployment rate has declined from 4.5 percent to 4 percent in three months, it means that 450,000 people were out of work then and 400,000 are out of work now. To an average reader, raw numbers alone may not mean much — it's hard to get your head around 400,000 of anything — but they offer perspective in a story where percent and percentage are subject to partisan bickering.

Sometimes, in fact, real numbers give a much clearer picture of things than percent or percentage. For instance, critics of tougher education policies could point to a University of Michigan study as evidence that U.S. schoolchildren are forced to spend too much time on homework. The study showed that the average homework load on 6- to 8-year-olds had increased a remarkable 140 percent in about 20 years. That sounded brutal — until others pointed out, as the researchers had, that the increase in time spent on homework was actually an increase from 7.5 minutes a night to 18 minutes a night.

Average, mean and median

People who are not trained in statistics — which means most of us — take these three terms to mean basically the same thing: in the middle. That may be close enough for casual description, but precision in news accounts requires that editors make careful distinctions among them and make sure that the calculations used in stories are the ones that explain trends clearly and fairly.

Average and **mean** are the same thing. To get a mean or average, simply divide a sum by the number of parts that contribute to that sum. If a basketball player scores 17, 14, 23, 19 and 12 points in a five-game span, her average is the total number of points, 85, divided by the number of games, five — a 17-point average.

Averages are a useful way of presenting many kinds of numbers because they reduce complex information to clear, simple proportions. But they can mislead. If a small group of numbers is being averaged, a few extreme numbers can skew the result. If, for example, a news story about a pay raise for local police officers notes that the six cops in the small-town department already make an average salary of $38,000, many taxpayers are likely to question the need for a raise. But a simple average hides the fact that the police chief earns $64,000 a year, while another senior officer earns $52,000. The average salary for the rest of the department is only $28,000. A good editor would insist that the story include a median or a range of salaries for the department to provide a more balanced picture.

A **median** is a middle point. It is found not by adding a group of numbers, but by arranging them from highest to lowest and finding the one in the middle. Medians avoid the skewing common to averages by limiting the impact of a few very high or very low numbers. A story for the campus TV station about how much time students in your dormitory spend online, for example, would almost certainly provide a more realistic picture of Internet use by using a median figure rather than an average. The reason? A few Net addicts never log off; their online marathons inflate everyone else's time online. But if a median is used to depict the typical student, a 15-hour-a-day Internet habit carries no more weight than a 15-minute-a-day e-mail check at the other end of the scale.

But median numbers can occasionally mislead, too. In some stories, the extreme numbers at the ends of the scale *should* carry full weight. This is especially true in stories about health and safety, where risks may not be constant or evenly distributed but are nevertheless real. A story about student drug and alcohol abuse might note that the campus health clinic treated a monthly median of just three drug and alcohol cases in the past year. But the real month-by-month numbers show spikes of more than 20 cases in September, December, January and May — the party months at the start and end of each semester. A median buries those worrisome

numbers behind an equal number of slow months at the clinic when students are busy studying. By doing so, it hides a major health threat on campus.

Rate change

A rate is simply a ratio between two measurements. You are already familiar with many kinds of rates. Your pulse, for example, is your number of heartbeats per minute. Speed is typically stated in miles per hour. Rates allow us to compare places, or companies of different size, or activities across time, because they provide a common means of measurement. Rates are usually more useful than raw numbers because they show a relationship between numbers based on a standard, such as a unit per time, a unit per population or another quantity. Some rates that regularly appear in the news include accident rates, crime rates, foreclosure rates and birth rates.

For example, suppose City A had 1,000 property foreclosures last year and City B had 1,500. Those raw numbers don't tell you much unless you know how many people live in each city. So rates are usually calculated per a standard unit, say per 10,000 people. The word "per" is used to separate the two measurements used to calculate the rate. Let's see how that works.

To calculate a rate, you form a fraction, dividing one number (the raw number of foreclosures in our example) by the other number in the relationship (how many people live in the city). You also have to figure in the standard unit you are going to use (one way is by multiplying by that unit).

So City A had 1,000 foreclosures last year and a population of 300,000:

1,000 / 300,000 x 10,000 = 33.3 foreclosures for every 10,000 people.

And City B had 1,500 foreclosures and a population of 500,000:

1,500 / 500,000 x 10,000 = 30 foreclosure for every 10,000 people.

Note that by expressing the foreclosures in rate form, you can make an easy comparison of cities with different populations.

You can use the same basic formula to calculate all kinds of rates. Here is another example using a different way to calculate for the unit of measurement.

Suppose there are 60,000 cardiologists in the United States, which has a population of about 312 million. Here's how to find the rate of cardiologists per 100,000 people:

Put the number of cardiologists, 60,000, over the population, 312,000,000, and divide the top number by the bottom number. The result of the division gives us .0001923. Then to get the rate per 100,000 residents, move the decimal point over five places to the right and you get 19.23, which is rounded

to 19. So you can say that there are about 19 cardiologists per 100,000 people in the United States.

Numbers used in polling stories

The news media at their best listen as well as speak. Good editors always have worked hard to keep abreast of public opinion and know what people are talking about on the street. Letters to the editor, telephone calls, email and story comments all make that process easier.

But while journalists can make educated guesses about public attitudes through such means, they are still guesses. The dozens of letters to the editor supporting or opposing gun control may be part of an organized campaign by a few activists rather than a show of majority opinion. The angry email complaints about dorm conditions may come from the four students out of 5,000 whose air conditioning went out during a heat wave.

Over the past century, a more reliable way of measuring public attitudes has evolved: polling. Pollsters use mathematical principles to calculate more accurately what journalists have long done by instinct and legwork. Pollsters figure out what the public thinks — or at least what it claims to think. And in recent decades, polls have become a mainstay of the media. It is hard to go to an online news site, view a televised newscast, or pick up a paper or newsmagazine without finding out about a new poll. The opinions in the poll may be devoted to something as monumental as public support for a war or something as trivial as whether men prefer briefs or boxers. In either case, polls have become not just a technique for measuring public opinion but a way of seeing ourselves.

As polling is now an integral part of the news, one aim of this chapter is to give some perspective to that process. While polls have in some ways revolutionized the way news is gathered, focused and even defined, they do not replace sound reporting and editing skills. Polls are tools.

Some of them are much better tools than others. Many in the media have enthusiastically embraced polling as a new and popular way of providing news, but many more have little knowledge of how the polling process really works and how it can mislead both journalists and the public. Polls can as easily distort public opinion as reflect it. The second aim of this chapter is to explain the basic elements of polling so that future editors can make sound judgments about how and when polls work best — and how they can warp the news.

A primer on polling

For most pollsters and journalists, the terms *poll* and *survey* are synonymous, and we will use them interchangeably in this chapter. A **poll** or survey measures and categorizes public attitudes on a topic or range of

topics at a certain time by posing precise questions to a specific audience and quantifying the responses.

Polling is done by a variety of organizations and individuals. Some polls are performed by respected independent companies that specialize in the field and have a long and accurate track record. Others are done by political groups or businesses that may have a vested interest in the results. And media organizations increasingly do their own polling. The source of a poll is an early indicator of its neutrality, if not its accuracy.

Whatever the source, polls are considered potential news. Everyone, after all, is interested in what other people think. A poll on presidential candidates as Election Day nears might be considered a lead story; a poll about airline food or people's belief in ghosts might rate a brief on the travel or feature page. Both, however, attempt to mirror public attitudes about a topic of interest.

The sheer onslaught of polls about topics large and small has raised concern on several fronts, though. Critics argue that even news stories about reliable polls can unfairly influence public opinion at certain times. They say that the current mania for polling has opened the field to incompetent and unscrupulous pollsters. And they complain that many measures of public sentiment that are casually identified as polls are nothing of the sort. Let's consider those three complaints.

Polls and the democratic process

Media critics and a few journalists argue that some polls should be kept out of the news at certain times. During election campaigns, for example, polls measure the standing of candidates almost daily, and fortunes can shift drastically from week to week. Such polls might provide a snapshot of where candidates stand at a particular moment. But is the momentary value of that news negated by the effect it can have on voters? A voter who supports a promising but little-known candidate may be discouraged by polls that show the candidate getting scant support. As a result, she may switch her allegiance to a better-known candidate.

Think of this "bandwagon effect' repeated millions of times. Do polls eliminate good but lesser-known candidates early in a campaign by inadvertently boosting front-runners and prominent figures? Do they discourage voting on Election Day by suggesting that a candidate with a big lead is a sure thing? Critics say yes. Supporters say no, arguing that voters with firm opinions resist the bandwagon effect and that less-certain voters are at least being influenced by accurate information rather than campaign rhetoric. Some news organizations will not run last-minute polls before an election.

Problems in local polling

Critics are on firmer ground when they warn of badly conducted or simply fraudulent polls. Mangled and heavily biased results are rare among established national polling organizations, but they are not uncommon at the local level, where part-time and amateur pollsters may not have the resources or knowledge to conduct highly accurate surveys.

Local media, for instance, sometimes use their own employees to conduct surveys of residents' attitudes and habits. These surveys are used both by the newsroom, as the basis for stories and coverage decisions, and by the marketing department, as a tool for advertising sales. While the information provided by such surveys may help marketers generalize about the public, it typically falls short of the accuracy standards observed by professional pollsters. One reason: Such polls often ask questions only of the news provider's own readers or viewers, not the public at large.

Polls that are not polls

More common still are cheap, nonscientific polls by media organizations. Call-in or online polls seek readers' or viewers' opinions without applying the methodology needed to draw firm conclusions about public attitudes.

For example, a small TV station asks readers to rate area grocery stores in a call-in poll. One creative, determined caller who bought a stale loaf of bread five years ago at Pandora's Pantry can damage the reputation of a business merely by speed-dialing several dozen times. A clerk transcribes the cassette tape that recorded viewers' comments, and a reporter dutifully notes that 40 out of the 100 people "surveyed" complained about stale bread at Pandora's Pantry.

Such skewed readings of public opinion are made even more common by online polls on web news sites in which users are invited to weigh in on hot-button issues of the day with the click of a mouse. Many such polls have no safeguards against repeat responses. Even when they do, they are based on a self-selecting pool of respondents — usually people who are motivated by strong or critical feelings about the issue.

The media's attitude toward polls

Polls that do use scientific methods have proven to be pretty accurate, and that accuracy is the basis for the growing popularity of polling. In the century since public opinion surveys emerged as a key element of election coverage, professional polling has become more reliable and more newsworthy. The solid track record of national independent pollsters in such high-profile matters as predicting election outcomes has validated polling's basic methodology and won public and media acceptance of the field. Whatever criticisms might be directed toward particular polls, polling

in general has won over most of its critics and become an integral part of the news.

That acceptance has come at a cost. Some news organizations, assuming that any poll handled by a reputable organization or distributed by the wire services is sound, simply accept the findings at face value. They pay little attention to the fine print. They are reluctant to highlight the "margin of error"; why undermine the audience's confidence in the numbers on the basis of some scientific mumbo-jumbo? Many broadcasters, and a few newspapers, simply delete margin-of-error information from stories about polls. And wire-service accounts do not always include such details anyway.

No poll, though, can be understood and evaluated without a margin of error and other statistical information that provide clues to the poll's accuracy. Reputable professionals include all such information, including possible sources of error, when they release poll findings. Editors have a duty to pass that information along to their audience. They also have a duty to explain to readers and viewers exactly how polls work and what the "mumbo-jumbo" means, just as they would explain an unfamiliar medical or technical term when it has to be used in a story.

Key concepts in poll results

You need not be an expert in statistics in order to use polls fairly and accurately in the news, any more than you need to be a mechanic in order to drive a car safely. Editors need only learn a few terms and techniques in order to evaluate polls and serve the audience more reliably.

> About a third of adult Americans think aliens have visited Earth in flying saucers, according to a poll released yesterday by the Institute for the Study of Alien Life. The national telephone poll of 200 adults conducted last week found that 32 percent believed in UFOs. At a 95 percent confidence level, the poll has a margin of error of plus or minus 7 percentage points.

The number that leaps from this imaginary story is, of course, 32 percent. But note that there are several other numbers as well, all of which are just as crucial to understanding the poll and its implications:

- The sample size, or number of respondents to the poll;
- The confidence level;
- The margin of error.

These three interrelated numbers provide editors and their audiences with some of the indispensable information they need to interpret the poll's conclusion that nearly a third of Americans believe in UFOs. Let's consider each statistic individually.

Sample size

Few polls ask questions of everyone in the group whose opinions the poll is about. The UFO pollsters claim their conclusions are representative of what the nation as a whole believes. But they spoke with only 200 people, not everyone in the United States. The number of people who took part in the poll is called the sample size.

The sample size gives readers some idea of how to assess the findings. Most polls ask questions of a random sample of people and then generalize about the group as a whole. (The techniques of random sampling are explained later in this chapter.) If only 10 people are questioned, the chances of being able to make accurate generalizations about a much larger group are almost certainly very low. But if 1,000 people are questioned, the chances of getting an accurate picture increase considerably. Pollsters have taken that bit of common-sense intuition a step farther and calculated exactly how reliable samples of various sizes are likely to be.

Confidence level

Legitimate pollsters do not claim that their findings are absolutely certain. They say that their results are *probably* accurate. By using a mathematical formula, they are able to rate that probability in the form of a percent, called the poll's confidence level. The UFO pollsters say there is a 95 percent chance that their results accurately reflect the beliefs of the nation as a whole; therefore the poll has a 95 percent confidence level.

The confidence level can reach 100 percent only when all the people in a group are polled and respond. That is an impossible task when doing most news polls. So pollsters usually use 95 percent as a standard confidence level. That means being right 19 out of 20 times, which is a pretty reliable track record.

A poll's confidence level depends in part on the size of the sample, but it is also related to a third key statistic, one that calculates exactly *how* accurate the poll is. That statistic is called the margin of error.

Margin of error

If a poll's confidence level shows the probability that the poll is accurate, the margin of error shows the *degree* or *range* of that accuracy. The margin of error in the UFO poll is plus or minus 7 percentage points (rounded off from 6.9 percentage points as shown in Box 11-3). That means that the poll's conclusion that 32 percent of Americans believe in UFOs could actually range from 7 percentage points lower than 32 percent to 7 percentage points higher. We could rephrase the conclusion to say that from 25 percent to 39 percent of Americans believe in UFOs.

That's a pretty wide range —14 percentage points. On issues with practical implications, such as support for a candidate or a war, that level of uncertainty would make the poll useless. Professional pollsters therefore work hard to keep the margin of error much smaller than that. Most reliable polls have a margin of error of about 3 or 4 percentage points.

One way to decrease the margin of error is to increase the sample size. Another is to reduce the confidence level. The three are interrelated — changing one affects the other two. Box 11-3 shows this relationship among sample size, confidence level and margin of error. Note that while a larger sample size always means a smaller margin of error, the gains in accuracy diminish as the samples grow. When questioning 10,000 people instead of 5,000, a pollster must do twice as much work to gain very little accuracy.

All news stories about polls should report, at the very least, the sample size and the margin of error, along with a precise identification of who did the polling and when. This information is crucial in helping people evaluate the reliability of polls. Reporting a poll's confidence level is usually less important because a 95 percent confidence level is regarded as standard unless otherwise stated. But editors themselves should check the confidence level of every poll to make certain the 95 percent standard has been met. Polls with lower confidence levels are in most cases not reliable enough to use at all.

Sample size, confidence level, and margin of error are the key factors in assessing the value of polls, but they are not the only ones. The actual questions that pollsters ask can skew the process and undermine a poll's credibility. Poll stories emphasize how respondents answered, but they often downplay what those respondents were asked. Good editors read carefully to find out.

Bias in the questioning process

- "Do you believe that the government should ignore the biblical commandment 'Thou shalt not kill' in dealing with its most violent citizens?"
- "Do you believe that capital punishment is a fitting and constitutional punishment for the most heinous murders?"
- "Do you believe that brutal, cold-blooded killers ought to pay the ultimate price for their crimes?"

Do you believe that a person who has complicated feelings about the death penalty would give the same answer to all three of those questions?

It's not likely. Though the three questions all ask the respondent to take a position on the same issue, they slant the question in different ways. Each cues the respondent to think about the death penalty in a certain context: religion, law or revenge. Each question appeals to different

emotions and social values. And each suggests that one answer is "correct,"

Most pollsters are careful to phrase questions in a more neutral way than this, but words can never be entirely value-free or mean exactly the same thing to all people. The wording of questions may be the single biggest source of error in polls. Polls assume that people understand the questions fully and objectively, that they have well-formed opinions, and that they are answering honestly. However, the reliability of people's answers depends on a lot of things, including:

- How and when the questions are asked;
- How the questions are "set up," or colored by preceding questions;
- Whether the respondent has a considered opinion or is simply answering without thinking the issue through.

Poll responses can also depend on personal, emotional and psychological factors. And people can simply change their minds. Even at their most reliable, polls measure only what respondents are thinking at the moment they are asked.

Leo Bogart, who was a public-opinion specialist and author who had directed polls for many corporations, explained the risks this way:

> Human nature is too subtle, fragile and complex to be measured by a question that asks, "Do you agree or disagree?" Opinions are contradictory and illogical, subject to constant shifting and change. … Opinion surveys are often dubious indicators of actual behavior because they do not, and perhaps cannot, measure the seething, changing character of the public temper.

Pollsters have sought to minimize such variables by carefully analyzing questions and responses over many years. They slowly have learned to formulate questions in ways that avoid overt bias and have a greater chance of ascertaining what people really think.

Keys to avoiding bias and oversimplification

The best polls word questions carefully to avoid bias. They ask questions specific enough to avoid misleading generalities. And they pose similar questions in several ways to get at what people really think. These practices minimize some inaccuracies, but editors can take additional steps to ensure that polls are firmly grounded in reliable data.

- **Who is behind the poll?** The first thing an editor should think about is who sponsored a poll and what that organization or person might have riding on the outcome. Major national polling organizations such as the Roper Organization, the Gallup Organization, Pew Research Center, and university-based researchers such as the National Opinion Research Center

(University of Chicago) and the Survey Research Center (University of Michigan) are trustworthy names that have built their reputations on years of reliable, independent surveys.

More problematic are polls by corporations, political parties, lobbying groups and other organizations with a product or a viewpoint to promote. A poll by a tobacco company, for example, is almost certain to show more tolerance toward smoking than one done by an independent firm; a poll on the same subject conducted by a children's health organization is likely to show less tolerance. Similarly, you can be sure that a survey by a political party will show more support for its own candidates than an independent poll taken in the same area on the same day.

Does this mean that pollsters working for a particular interest group are cooking the numbers or otherwise consciously cheating? Probably not. More often, such polls phrase questions and select respondents in a way likely to produce the desired outcome. Remember, too, that such organizations conduct many polls and prefer to publicize only the ones that show them in a positive light. Such polls are promotional tools, not scientific reflections of public opinion.

• **Do the questions oversimplify?** Editors should be wary of wording that asks about complicated behavior in one simple question. Roper, one of the largest and most respected pollsters, asked this question for more than a decade in its annual survey for the TV Information Office:

> I'd like to ask you where you usually get most of your news about what's going on in the world today — from the newspaper, radio, television or talking to people or where?"

The most common answer year after year was television. But other polls that broke the same question down into such categories as community news, regional news, state, national and international news got a more complex profile of people's news habits in which television was not always the dominant medium. According to the "Newsroom Guide to Polls and Surveys" by G. Cleveland Wilhoit and David Weaver, who compared the polls, many respondents to the Roper poll may have understood the phrase "in the world" to exclude local and state news. Those are areas where newspapers and their web sites, and even word of mouth, were likely to be frequent news sources.

• **Do questions use loaded words or phases?** Polling experts have discovered that certain words have strong and sometimes emotional connotations. Researcher Tom Smith, for instance, found when polling about public assistance that support for "more assistance for the poor" was 39 percentage points higher than support for "welfare." Smith, who directs the General Social Survey at the University of Chicago, concluded that "'welfare' seems to connote a wasteful program that encourages sloth and sponging." This is sometimes called the "dog whistle" theory, which

states that people often hear implications in a question that the pollster did not intend.

Responses can also be tilted by the order of in which questions are asked, even when the wording is impartial. This is a particular risk when a simple question with a "gut" answer is followed by a more complicated question. Think about how your response to the second question in each of these pairs is influenced by the first:

1) Do you think a major intercollegiate sports program is an important part of campus life and school identity?

2) Do you support the university's plan build a $30 million football stadium?

1) Do you think next year's 8 percent tuition increase will create more academic resources?

2) Do you support the university's plan to build a $30 million football stadium?

Editors should always consider ways to print or show polling questions themselves rather than just a summary of responses. That is not always possible; it requires valuable news space and broadcast time. It is often possible, though, to quote or closely paraphrase the most important questions in major polls, as well as polls that address sensitive and controversial issues. When that cannot be done, editors should act as the audience's representatives, combing the questions carefully to make certain that they meet basic standards of impartiality and clarity. Questions that do not should be eliminated. Polls with several questions that fail the test should not be used at all.

Answers made to order

In the early days of professional polling, people were asked whether something called the Metallic Metals Act was good national policy. Fifty percent of those polled agreed that "it would be a good thing but should be left to individual states"; 16 percent agreed that "it is all right for foreign countries but should not be required here." Most of the rest said they had no opinion — which in this case was the most enlightened response, because the Metallic Metals Act did not exist.

The Metallic Metals Act "poll" was actually a bit of polling research into a phenomenon that experts had recognized and were trying to measure: Many people will lie to pollsters. In the case of this 1948 poll, no one had a clue what the Metallic Metals Act was, but two out of every three respondents had an opinion on it. Why? Researchers have since found that untruthful responses fall into several categories:

• People may not be familiar with an issue but do not want to appear ill-informed or apathetic. Opinions are valued in a democracy, and many people would rather invent one on the spot than admit to not having one.

• People who are defensive about their opinions often are not willing to express them to strangers, even professional pollsters. Campaign polls, for example, frequently show African-American candidates as having more support from white voters than they actually receive on Election Day.

• People sometimes say they voted in the last election even if they didn't. They do not want to appear as if they are neglecting their civic duty.

Talking to an interviewer is a social encounter, and it is subject to the same subtle pressures and cues that shape other human exchanges. Poll researchers have managed to measure, and partly explain, what everyone instinctively knows: People often say what they think the listener wants to hear.

Responsible modern pollsters have taken lessons from such research. They have learned to phrase questions so they do not seem to ask for a particular response. They have also devised question formats that allow respondents to admit not knowing, with little or no loss of face. For example, a respondent might first be asked if he or she has read or heard anything about a given topic. If the answer is no, the respondent is not asked for an opinion. Or a question might be posed in a way that offers three equal options: yes, no and no opinion. Such questions play into respondents' eagerness to answer by making the "escape hatch" — the no-opinion response — as legitimate as other answers.

The importance of saying when

Breaking news can influence public opinion in dramatic ways. In the wake of the Sept. 11, 2001, terrorist attacks, U.S. polls showed support for President Bush soaring to record levels approaching 90 percent — unheard-of backing for a leader who had won a divisive, court-contested election less than a year earlier. Bush's support remained high for two years as he initiated security measures and ordered military action in Afghanistan and Iraq. And even when U.S. support for the lengthening war in Iraq fell below 50 percent, as reported in a Washington Post-ABC News poll in October 2003, support for the president himself remained well over 50 percent.

Such polls reflect a well-known phenomenon: In an atmosphere of crisis, people tend to rally around their leaders and common values. More typically, though, poll support for a particular figure or cause tends to rise and fall in response to more passing influences.

That underscore the importance of telling the audience exactly when a poll was conducted, and when necessary to make note of events that may have influenced the results. Such information allows the audience to

put the poll in context. This is especially crucial in polls about ongoing news events such as criminal trials, where public perception of a defendant's guilt or innocence can swing wildly based on each day's evidence.

Scientific and nonscientific polls

How can the answers of a small group of people accurately represent the attitudes of a much larger population? The key is a simple concept with a complicated name: random probability sampling. Reliable polls begin with a **random sampling** of people from the group that the poll is drawing conclusions about, whether that group is U.S. citizens, college women or lefthanded guitar players.

In order for a pollster to have a truly random sample, every person in that group — known as the poll's "universe" — must have an equal chance of being chosen for an interview. A random sampling of U.S. citizens is not 10 people, or even 10,000 people, at the local mall. Such a poll has already eliminated everyone who doesn't go to the mall; therefore the poll is not representative, no matter how large the sample.

The importance of random sampling

The pollster George Gallup once compared random sampling to a cook tasting a spoonful of soup to determine how the entire pot tastes. If the pot is well stirred, one spoonful should have a little of everything in fair proportions. It may not taste exactly like every other spoonful in the pot, but it will be very close. It will be *representative*.

When a random sample is used, researchers can apply the laws of probability to draw conclusions that go far beyond the sample size. That is why 1,000 people, randomly chosen, can represent the views of a nation of nearly 300 million people with reasonable accuracy. They are like Gallup's spoonful.

But how do pollsters select people randomly? They could walk down the street in the middle of the day, close their eyes and point. That seems about as random as one can get; in fact, it's pretty much the selection process used in those person-on-the-street surveys that local newspapers and broadcasters love. However, while that may seem random, they are choosing from a group that is already, by definition, *not* random. There are no shut-ins on the street, nor are there people who work out of town. Students are in school. Night workers are asleep. Is there a pharmacy two doors down? The sampling will over-represent older people. Is it a bookstore? Too many college-educated people. Acquiring a true random sample is not easy.

The difficulty of random sampling

Residential phone listings are perhaps the most obvious place to begin, but even they present problems. Suppose a researcher decided to call every 10th number listed. What about people with unlisted numbers, estimated to be almost 40 percent in urban areas? They have immediately been eliminated from the pool of possible respondents. So have people who have only cellphones or have moved into the area since the listing was updated.

The solution: computer-generated phone lists that include landline and cellphones. They provide the closest thing to a pure random sample yet devised. But a report by the Pew Research Center in 2010 said that while nationally Pew and some other organizations interview on cellphones, few state- and district-level polls do so. This is in part because solicitation-type calls to a cell phone are subject to strict regulation because the phone's owner must pay for use. The Pew report said that in 2010, about 25 percent of all U.S. adults use only cellphones.

Another problem is that if calls are made only during the day, people who work days won't be home to respond. If calls are made only at night, night workers and those who go out a lot won't be part of the sample. In both cases, large segments of the population would be left out and the results would not be representative. Remember: Every person in the group must have an equal chance of being questioned.

Major pollsters hire interviewers to work both days and nights in order to reach a cross-section of people. They call each number back several times if necessary. However, smaller researchers with limited budgets may not be able to call a potential respondent over and over. As a result, the accuracy of their polls can suffer.

New wrinkles: Caller ID and online polling

Telephone and computer technology has vastly improved polling since the early days when pioneering pollsters went door to door, clipboards in hand. But in recent years, that technology also has created new obstacles for polling organizations. Caller-identification systems now enable people to screen and ignore calls from unknown callers.

Pollsters have tried to compensate by increasing callbacks to home phones, but this has both increased the cost of polling and slowed the collection of information.

Online polling can also skew responses. Not everyone in the U.S. uses the Internet, and those who do not are demographically different from the rest of the public. Also, the people who volunteer for polls may be different from other people in ways that could make the poll unrepresentative. At worst, online polls can be seriously biased if people who hold a particular

point of view are more motivated to participate than those with a different point of view.

Fewer responses, less reliability

When a person cannot be reached, or is reached but refuses to participate in the poll, he or she is called a nonrespondent. Researchers estimate that between one-ftfth and one-third of the people targeted for a poll will be nonrespondents, although the figure can vary widely depending on the poll's scope and location. The greater the percentage of nonrespondents, the greater the chance that the sample is not representative and the less likely it is that the poll will be accurate.

When responses are broken down into subgroups such as males and females, racial groups, or age groups, knowing the number of nonrespondents is even more important. There must be enough respondents in each category to be able to generalize about that subgroup. Often in such polls, the margin of error will vary from group to group. It is important in those cases that an editor make the audience aware of the fluctuating margin of error; it means that some sections of the poll are more reliable than others.

Weighting the data

Most pollsters adjust for under-representation of subgroups by using a technique called weighting. In weighting, answers from an under-represented subgroup are given added emphasis to reflect that subgroup's actual presence in the poll's universe — the full group from which the pool of respondents is taken.

For example, if in a poll of the state's potential voters, women make up only 45 percent of the respondents but are known to make up 50 percent of the population that is registered to vote, pollsters would give women's responses a slightly heavier weight relative to men's responses. That adjustment would seem to make the poll more accurate.

But weighting poses risks. It can be a crutch for pollsters who are tempted to cut corners when doing their research. Many critics also believe that weighting leads to unsubstantiated assumptions about what the people in the weighted subgroup think.

If, for example, a random sampling of 1,000 of a city's residents should include 200 African-Americans, but only 120 are actually interviewed, is it accurate to assume that the opinions of the "missing" 80 respondents would reflect those of the 120 whose opinions are included? Critics say no. They claim that weighting has the effect of watering down the opinions of chronically under-represented groups, particularly minorities, so that their opinions seem more alike than they actually are. Supporters counter that when weighting is based on accurate, up-to-date

census data, it is a valuable tool. No one argues that weighting is more accurate than random sampling, however, and all polls that rely on weighting should say so.

Polls that are not polls

Interactive journalism that solicits and acts on the opinions of the news audience has become a crucial tool for editors and producers. When news breaks, television newscasters offer up viewer e-mail on the story. Radio talk shows keep a running tally of calls "for" and "against" a controversial position or public figure. Newspaper editors send reporters to a busy corner, mall or student hangout to collect quotes on everything from political issues to Super Bowl predictions. And all of them post polls on their Web sites, urging visitors to log on and speak up about the day's hot topic or celebrity.

The results of such surveys may offer a technical admission that the numbers are not necessarily accurate, but such disclaimers are too often cloaked in a quick aside or even a sales pitch: "Here's what you told us …" "In an informal survey …" "While not scientific, the results show … "What people are saying …" "The average person on the street thinks …"

Interactive coverage of this kind may make the media appear tuned-in and responsive. But as representations of public opinion, such polls are illusory and sometimes dangerous. They are not based on random sampling or other reliable scientific controls. The reporter who stands on a corner in the business district and asks passersby whether they would use Viagra will certainly get some interesting quotes, but she won't get any useful statistics.

That is not to say that such stories are not fun and even insightful. Part of a journalist's job, after all, is to document the thoughts and feelings of individual people, to tell stories and to register trends and changes. Polling changes none of that; at its best, it reinforces good reporting and gives it an added dimension.

The problem arises when a story based on anecdotal research or a few mouse clicks on a web site makes an explicit or implicit claim to be a meaningful poll. "They're giving people false impressions of how public research is done and a false impression of public opinion overall," Howard Fienberg, of the Marketing Research Association, told Editor and Publisher magazine.

When broadcast and Internet media offer call-in and web surveys, they appeal only to people who happen to be paying attention when the question is asked and are motivated to respond. A study by the Pew Research Center for the People & the Press in 2002, for instance, found that 46 percent of Republicans who followed politics on the Web liked to participate in online surveys, while only 28 percent of Democrats did.

While the media usually offer casual admissions that such surveys are "nonscientific," the disclaimer may be buried, or it may not be fully understood by large segments of the public. And even if it is voiced or printed prominently, the question remains: If a survey is nonscientific and therefore unreliable, why lend it credibility by giving it the status of real news?

Insight: Rob Daves

Daves is former director of the Minnesota Poll and is now a principal at Daves & Associates Research in Minneapolis. He also teaches survey methodology at the University of Minnesota's Humphrey Institute.

During more than a decade of editing poll stories and graphics, I've developed a mental checklist of things I attend to when I sit down to edit — or write — a story or graphic based on polling and survey data. In many cases, the same principles apply to poll stories as to other stories: fairness, completeness, accuracy, balance and the rest. But here are some nitty-gritty hints for making sure your copy sparkles and your story meets those lofty objectives.

• **Get the Big Three in.** Be sure that the story tells what the numbers are, what the numbers mean for the reader, and get real people's words in the story.

• **Follow the American Association of Public Opinion Researchers' standards of disclosure.** Knowing how questions are worded is crucial to understanding the poll's findings. You should also tell your readers who sponsored the research, when it was conducted, the sample size, etc. AAPOR's standards are prominently displayed on the group's Web site at www.aapor.org.

• **Be balanced and fair.** Make sure poll respondents' quotes reflect the findings and tone of the story. Try to balance quotes from all sides of the issue. And if the survey shows that Politician A's approval rating is way down, give him or her a chance to comment.

• **Use hard numbers, not approximations.** If the poll finds 68 percent support for an issue, don't call it "about 70 percent." In what other kind of story would an editor prefer the *less* accurate version?

• **Match the modifier with the meaning.** Be wary of polling clichés such as *overwhelming lead* and *lackluster performance*. In the first case, also-rans have overcome many large leads. In the second, *lackluster* is a relative term; what may be lackluster in some cases is sterling in another.

• **Make sure the numbers in the story match the numbers in the graphic.** Yeah, yeah, it's basic, but it's often forgotten.

• **Make sure your expert really is one.** Sometimes a poll finding is so startling that an editor asks a reporter to dig up an expert to comment on it. Make sure that the expert really is outstanding in his or her field — the right field. A political scientist from a nearby university may be distinguished for her work in constitutional law, but if the poll is about a Senate campaign she's not likely to offer much insight.

Box 11-3: Relationship of sample size, confidence level and margin of error

Sample size	Margin of error at 95% confidence level	Margin of error at 99% confidence level
10	30.1	40.1
100	9.8	12.9
200	6.9	9.1
1,000	3.1	4.1
2,000	2.2	2.9
5,000	1.4	1.8
10,000	1.0	1.3